NAME _____ DATE _____ PERIOD _____

11-5 Study Guide and Intervention

The Distance Formula

Look → * All work on looseleaf.

The Distance Formula The Pythagorean Theorem can be used to derive the **Distance Formula** shown below. The Distance Formula can then be used to find the distance between any two points in the coordinate plane.

Distance Formula	The distance between any two points with coordinates (x_1, y_1) and (x_2, y_2) is given by $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

(run) (rise)

Example 1 **Find the distance between the points at (−5, 2) and (4, 5).**

$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ Distance Formula

$= \sqrt{(4 - (-5))^2 + (5 - 2)^2}$ $(x_1, y_1) = (-5, 2), (x_2, y_2) = (4, 5)$

$= \sqrt{9^2 + 3^2}$ Simplify.

$= \sqrt{81 + 9}$ Evaluate squares and simplify.

$= \sqrt{90}$

The distance is $\sqrt{90}$, or about 9.49 units.

$\sqrt{9}\ \sqrt{10}$

$= 3\sqrt{10}$ or 9.49

simplest radical form

Example 2 **Jill draws a line segment from point (1, 4) on her computer screen to point (98, 49). How long is the segment?**

$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(98 - 1)^2 + (49 - 4)^2}$

$= \sqrt{97^2 + 45^2}$

$= \sqrt{9409 + 2025}$

$= \sqrt{11{,}434}$

The segment is about 106.93 units long.

Exercises

Find the distance between each pair of points whose coordinates are given. Express answers in simplest radical form and as decimal approximations rounded to the nearest hundredth if necessary.

1. (1, 5), (3, 1)

2. (0, 0), (6, 8)

3. (−2, −8), (7, −3)

4. (6, −7), (−2, 8)

5. (1, 5), (−8, 4)

6. (3, −4), (−4, −4)

7. (−1, 4), (3, 2)

8. (0, 0), (−3, 5)

9. (2, −6), (−7, 1)

10. (−2, −5), (0, 8)

11. (3, 4), (0, 0)

12. (3, −4), (−4, −16)

13. (1, −1), (3, −2)

14. (−2, 0), (−3, −9)

15. (−9, 0), (−2, 5)

16. (2, −7), (−2, −2)

17. (1, −3), (−8, 21)

18. (−3, −5), (1, −8)

Lesson 11-5